

219931US-0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
HIROSHI AKEMA ET AL : ATTN: APPLICATION DIVISION
SERIAL NO: NEW U.S. PCT APPLN:
(Based on PCT/JP01/05660)
FILED: HEREWITH :
FOR: RUBBER COMPOSITION :

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Prior to examination on the merits, please amend the above-identified application as follows.

IN THE CLAIMS

Please amend the claims as shown on the marked-up copy following this amendment to read as follows.

5. (Amended) The rubber composition according to claim 1, wherein,
- a monomer forming said conjugated diene unit constituting said crosslinked rubber particle is at least one selected from the group consisting of 1,3-butadiene, 2,3-dimethyl-1,3-butadiene, isoprene and chloroprene,
- a monomer forming said aromatic vinyl monomer unit constituting said crosslinked rubber particle is at least one selected from the group consisting of styrene, 2-methylstyrene,

3-methylstyrene, 4-methylstyrene, α -methylstyrene, 2,4-dimethylstyrene, 2,4-diisopropylstyrene, 4-tertbutylstyrene and tert-butoxystyrene, and

a monomer forming said monomer unit having said polymerizable unsaturated group constituting said crosslinked rubber particle is at least one selected from the group consisting of ethylene glycol di(meth)acrylate, propylene glycol di(meth)acrylate, 1,4-butanediol di(meth)acrylate, 1,6-hexanediol di(meth)acrylate, trimethylolpropane di(meth)acrylate, trimethylolpropane tri(meth)acrylate, pentaerythritol tri(meth)acrylate, pentaerythritol tetra(meth)acrylate, divinylbenzene, diisopropenylbenzene and trivinylbenzene.

6. (Amended) The rubber composition according to claim 1 wherein,

a monomer forming said conjugated diene unit constituting said conjugated diene/aromatic vinyl copolymeric rubber is at least one selected from the group consisting of 1,3-butadiene, 2,3-dimethyl-1,3-butadiene, isoprene and chloroprene, and

a monomer forming said aromatic vinyl monomer unit constituting said conjugated diene/aromatic vinyl copolymeric rubber is at least one selected from the group consisting of styrene, 2-methylstyrene, 3-methylstyrene, 4-methylstyrene, α -methylstyrene, 2,4-dimethylstyrene, 2,4-diisopropylstyrene, 4-tert-butylstyrene and tert-butoxystyrene.

7. (Amended) The rubber composition according to claim 1, further comprising a monomer unit formed by at least one selected from the group consisting of (meth)acrylonitrile, vinylidene cyanide, vinyl chloride, vinylidene chloride, (meth)acrylamide, maleimide, methyl (meth)acrylate, ethyl (meth)acrylate, n-propyl (meth)acrylate, isopropyl (meth)acrylate, n-butyl (meth)acrylate, iso-butyl (meth)acrylate, sec-butyl (meth)acrylate, tert-butyl (meth)acrylate, n-amyl (meth)acrylate, n-hexyl (meth)acrylate, 2-ethylhexyl (meth)acrylate and cyclohexyl (meth)acrylate as said monomer unit constituting said conjugated diene/aromatic vinyl copolymeric rubber.

8. (Amended) The rubber composition according to claim 1 wherein a monomer forming said conjugated diene/aromatic vinyl copolymeric rubber is a monomer having one polymerizable unsaturated group and at least one functional group selected from the group consisting of carboxylic group (CO_2H and/or CO_2^-), amino group, hydroxyl group, epoxy group and alkoxysilyl group, and content of monomer unit formed by said monomer is 0.1 to 30 % by weight with respect to said conjugated diene/aromatic vinyl copolymeric rubber.

10. (Amended) The rubber composition according to Claim 2 wherein a monomer forming said monomer unit (b4) is at least one selected from the group consisting of

a carboxyl group containing compound such as (meth)acrylic acid, maleic acid, fumaric acid, itaconic acid, tetraconic acid, cinnamic acid, monoesters of at least one selected from the group consisting of phthalic acid, succinic acid and adipic acid with (meth)allyl alcohol or 2-hydroxyethyl (meth)acrylate, and salts thereof,

a hydroxyl group containing compound such as 2-hydroxyethyl (meth)acrylates, 2-hydroxypropyl (meth)acrylates, 3-hydroxypropyl (meth)acrylates, 2-hydroxybutyl (meth)acrylates, 3-hydroxybutyl (meth)acrylates, 4-hydroxybutyl (meth)acrylates, mono (meth)acrylates of polyethylene glycol (the number of ethylene glycol units is 2 to 23), mono (meth)acrylates of polypropylene glycol (the number of propylene glycol units is 2 to 23), N-hydroxymethyl (meth)acrylamide, N-(2-hydroxyethyl) (meth)acrylamide, N,N-bis(2-hydroxyethyl) (meth)acrylamide, o-hydroxystyrene, m-hydroxystyrene, p-hydroxystyrene, o-hydroxy- α -methylstyrene, m-hydroxy- α -methylstyrene, p-hydroxy- α -methylstyrene p-vinylbenzyl alcohol and (meth)allyl alcohol, and

an epoxy group containing compound such as (meth)allylglycidylether, glycidyl (meth)acrylate and 3,4-oxycyclohexyl (meth)acrylate.

11. (Amended) The rubber composition according to claim 1 further comprising at least one of reinforcing filler selected from the group consisting of the inorganic compound represented by the formula (I), silica and carbon black.



[In the formula I, M_1 is at least one selected from the group consisting of Al, Mg, Ti, and Ca; any oxide of any of the metals; or any hydroxide of any of the metals; and m, x, y, and z are integers from 1 to 5, 0 to 10, 2 to 5, and 0 to 10 respectively.]

12. (Amended) The rubber composition according to claim 1 which is used for a tire.

Please add the following new Claims 13-19.

13. (New) The rubber composition according to claim 2, wherein,

a monomer forming said conjugated diene unit constituting said crosslinked rubber particle is at least one selected from the group consisting of 1,3-butadiene, 2,3-dimethyl-1,3-butadiene, isoprene and chloroprene,

a monomer forming said aromatic vinyl monomer unit constituting said crosslinked rubber particle is at least one selected from the group consisting of styrene, 2-methylstyrene, 3-methylstyrene, 4-methylstyrene, α -methylstyrene, 2,4-dimethylstyrene, 2,4-diisopropylstyrene, 4-tertbutylstyrene and tert-butoxystyrene, and

a monomer forming said monomer unit having said polymerizable unsaturated group constituting said crosslinked rubber particle is at least one selected from the group consisting of ethylene glycol di(meth)acrylate, propylene glycol di(meth)acrylate, 1,4-butanediol di(meth)acrylate, 1,6-hexanediol di(meth)acrylate, trimethylolpropane di(meth)acrylate, trimethylolpropane tri(meth)acrylate, pentaerythritol tri(meth)acrylate, pentaerythritol tetra(meth)acrylate, divinylbenzene, diisopropenylbenzene and trivinylbenzene.

14. (New) The rubber composition according to claim 2 wherein,
a monomer forming said conjugated diene unit constituting said conjugated diene/aromatic vinyl copolymeric rubber is at least one selected from the group consisting of 1,3-butadiene, 2,3-dimethyl-1,3-butadiene, isoprene and chloroprene, and

a monomer forming said aromatic vinyl monomer unit constituting said conjugated diene/aromatic vinyl copolymeric rubber is at least one selected from the group consisting of styrene, 2-methylstyrene, 3-methylstyrene, 4-methylstyrene, α -methylstyrene, 2,4-dimethylstyrene, 2,4-diisopropylstyrene, 4-tert-butylstyrene and tert-butoxystyrene.

15. (New) The rubber composition according to claim 2, further comprising a monomer unit formed by at least one selected from the group consisting of (meth)acrylonitrile, vinylidene cyanide, vinyl chloride, vinylidene chloride, (meth)acrylamide, maleimide, methyl (meth)acrylate, ethyl (meth)acrylate, n-propyl (meth)acrylate, isopropyl (meth)acrylate, n-butyl (meth)acrylate, iso-butyl (meth)acrylate, sec-butyl (meth)acrylate, tert-butyl (meth)acrylate, n-amyl (meth)acrylate, n-hexyl (meth)acrylate, 2-ethylhexyl (meth)acrylate and cyclohexyl (meth)acrylate as said monomer unit constituting said conjugated diene/aromatic vinyl copolymeric rubber.

16. (New) The rubber composition according to claim 2 wherein a monomer forming said conjugated diene/aromatic vinyl copolymeric rubber is a monomer having one polymerizable unsaturated group and at least one functional group selected from the group consisting of carboxylic group (CO_2H and/or CO_2^-), amino group, hydroxyl group, epoxy group and alkoxysilyl group, and content of monomer unit formed by said monomer is 0.1 to 30 % by weight with respect to said conjugated diene/aromatic vinyl copolymeric rubber.

17. (New) The rubber composition according to Claim 16, wherein said monomer having one polymerizable unsaturated group and said functional group is at least one selected from the group consisting of

a carboxyl group containing compound such as (meth)acrylic acid, maleic acid, fumaric acid, itaconic acid, tetraconic acid, cinnamic acid, monoesters of at least one selected from the group consisting of phthalic acid, succinic acid and adipic acid with (meth)allyl alcohol or 2-hydroxyethyl (meth)acrylate, and salts thereof,

an amino group containing compound such as dimethylaminomethyl (meth)acrylate, diethylaminomethyl (meth)acrylate, 2-dimethylaminoethyl (meth)acrylate, 2-diethylaminoethyl (meth)acrylate, 2-dimethylaminoethyl (meth)acrylate, 2-diethylaminoethyl (meth)acrylate, 2-(di-n-propylamino)ethyl (meth)acrylate, 2-dimethylaminopropyl (meth)acrylate, 2-diethylaminopropyl (meth)acrylate, 2-(di-n-propylamino)propyl (meth)acrylate, 3-dimethylaminopropyl (meth)acrylate, 3-diethylaminopropyl (meth)acrylate, 3-(di-n-propylamino)propyl (meth)acrylate, N-dimethylaminomethyl (meth)acrylamide, N-diethylaminomethyl (meth)acrylamide, N-(2-dimethylaminoethyl) (meth)acrylamide, N-(2-diethylaminoethyl) (meth)acrylamide, N-(2-dimethylaminopropyl) (meth)acrylamide, N-(2-diethylaminopropyl) (meth)acrylamide, N-(3-dimethylaminopropyl) (meth)acrylamide, N-(3-diethylaminopropyl) (meth)acrylamide, N,N-dimethyl-p-aminostyrene, N,N-diethyl-p-aminostyrene, dimethyl(p-vinylbenzyl)amine, diethyl(p-vinylbenzyl)amine, dimethyl(p-vinylphenethyl)amine, diethyl(p-vinylphenethyl)amine, dimethyl(p-vinylbenzyloxymethyl)amine, dimethyl[2-p-vinylbenzyloxyethyl]amine, diethyl(p-vinylbenzyloxymethyl)amine, diethyl[2-(p-vinylbenzyloxy)ethyl]amine, dimethyl(p-vinylphenethyloxymethyl)amine, dimethyl[2-(p-vinylphenethyloxy)ethyl]amine, diethyl(p-

vinylphenethyloxymethyl)amine, diethyl[2-(p-vinylphenethyloxy)ethyl]amine, 2-vinylpyridine, 3-vinylpyridine and 4-vinylpyridine,

a hydroxyl group containing compound such as 2-hydroxyethyl (meth)acrylates, 2-hydroxypropyl (meth)acrylates, 3-hydroxypropyl (meth)acrylates, 2-hydroxybutyl (meth)acrylates, 3-hydroxybutyl (meth)acrylates, 4-hydroxybutyl (meth)acrylates, mono (meth)acrylates of polyethylene glycol (the number of ethylene glycol units is 2 to 23), mono (meth)acrylates of polypropylene glycol (the number of propylene glycol units is 2 to 23), N-hydroxymethyl (meth)acrylamide, N-(2-hydroxyethyl) (meth)acrylamide, N,N-bis(2-hydroxyethyl) (meth)acrylamide, o-hydroxystyrene, m-hydroxystyrene, p-hydroxystyrene, o-hydroxy- α -methylstyrene, m-hydroxy- α -methylstyrene, p-hydroxy- α -methylstyrene p-vinylbenzyl alcohol and (meth)allyl alcohol,

an epoxy group containing compound such as (meth)allylglycidyl ether, glycidyl (meth)acrylate and 3,4-oxycyclohexyl (meth)acrylate, and

an alkoxysilyl group containing compound such as (meth)acryloxymethyl trimethoxysilane, (meth)acryloxymethyl methyltrimethoxysilane, (meth)acryloxymethyl dimethylmethoxysilane, (meth)acryloxymethyl triethoxysilane, (meth)acryloxymethyl methyldiethoxysilane, (meth)acryloxymethyl dimethylethoxysilane, (meth)acryloxymethyl tripropoxysilane, (meth)acryloxymethyl methyldipropoxysilane, (meth)acryloxymethyl dimethylpropoxysilane, γ -(meth)acryloxypropyl trimethoxysilane, γ -(meth)acryloxypropyl methyldimethoxysilane, γ -(meth)acryloxypropyl dimethylmethoxysilane, γ -(meth)acryloxypropyl triethoxysilane, γ -(meth)acryloxypropyl methyldiethoxysilane, γ -(meth)acryloxypropyl dimethylethoxysilane, γ -(meth)acryloxypropyl tripropoxysilane, γ -(meth)acryloxypropyl methyldipropoxysilane, γ -(meth)acryloxypropyl dimethylpropoxysilane, γ -(meth)acryloxypropyl methyldiphenoxysilane, γ -

(meth)acryloxypropyl dimethylphenoxysilane, γ -(meth)acryloxypropyl methylphenoxysilane and γ -(meth)acryloxypropyl dimethylphenoxysilane.

18. (Amended) The rubber composition according to claim 2 further comprising at least one of reinforcing filler selected from the group consisting of the inorganic compound represented by the formula (I), silica and carbon black.



[In the formula I, M_1 is at least one selected from the group consisting of Al, Mg, Ti, and Ca; any oxide of any of the metals; or any hydroxide of any of the metals; and m, x, y, and z are integers from 1 to 5, 0 to 10, 2 to 5, and 0 to 10 respectively.]

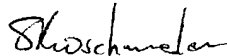
19. (Amended) The rubber composition according to claim 2 which is used for a tire.

REMARKS

Claims 1-19 are active in the present application. Claims 13-19 are new claims. Support for the new claims is found in the original claims. Claims 5-8 and 10-12 have been amended to remove multiple dependencies. No new matter is added. An action on the merits and allowance of the claims is solicited.

Respectfully submitted,

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Serial No:

2-28-2002

Amendment Filed on:

IN THE CLAIMS

Please amend the claims as shown on the marked-up copy following this amendment to read as follows.

5. (Amended) The rubber composition according to [any one of Claims 1 to 3] claim

1, wherein,

a monomer forming said conjugated diene unit constituting said crosslinked rubber particle is at least one selected from the group consisting of 1,3-butadiene, 2,3-dimethyl-1,3-butadiene, isoprene and chloroprene,

a monomer forming said aromatic vinyl monomer unit constituting said crosslinked rubber particle is at least one selected from the group consisting of styrene, 2-methylstyrene, 3-methylstyrene, 4-methylstyrene, α -methylstyrene, 2,4-dimethylstyrene, 2,4-diisopropylstyrene, 4-tertbutylstyrene and tert-butoxystyrene, and

a monomer forming said monomer unit having said polymerizable unsaturated group constituting said crosslinked rubber particle is at least one selected from the group consisting of ethylene glycol di(meth)acrylate, propylene glycol di(meth)acrylate, 1,4-butanediol di(meth)acrylate, 1,6-hexanediol di(meth)acrylate, trimethylolpropane di(meth)acrylate, trimethylolpropane tri(meth)acrylate, pentaerythritol tri(meth)acrylate, pentaerythritol tetra(meth)acrylate, divinylbenzene, diisopropenylbenzene and trivinylbenzene.

6. (Amended) The rubber composition according to [any one of Claims 1 to 5] claim
1 wherein,

a monomer forming said conjugated diene unit constituting said conjugated
diene/aromatic vinyl copolymeric rubber is at least one selected from the group consisting of
1,3-butadiene, 2,3-dimethyl-1,3-butadiene, isoprene and chloroprene, and

a monomer forming said aromatic vinyl monomer unit constituting said conjugated
diene/aromatic vinyl copolymeric rubber is at least one selected from the group consisting of
styrene, 2-methylstyrene, 3-methylstyrene, 4-methylstyrene, α -methylstyrene, 2,4-
dimethylstyrene, 2,4-diisopropylstyrene, 4-tert-butylstyrene and tert-butoxystyrene.

7. (Amended) The rubber composition according to [any one of Claims 1 to 6] claim
1, further comprising a monomer unit formed by at least one selected from the group
consisting of (meth)acrylonitrile, vinylidene cyanide, vinyl chloride, vinylidene chloride,
(meth)acrylamide, maleimide, methyl (meth)acrylate, ethyl (meth)acrylate, n-propyl
(meth)acrylate, isopropyl (meth)acrylate, n-butyl (meth)acrylate, iso-butyl (meth)acrylate,
sec-butyl (meth)acrylate, tert-butyl (meth)acrylate, n-amyl (meth)acrylate, n-hexyl
(meth)acrylate, 2-ethylhexyl (meth)acrylate and cyclohexyl (meth)acrylate as said monomer
unit constituting said conjugated diene/aromatic vinyl copolymeric rubber.

8. (Amended) The rubber composition according to [any one of Claims 1 to 7] claim
1

wherein a monomer forming said conjugated diene/aromatic vinyl copolymeric
rubber is a monomer having one polymerizable unsaturated group and at least one functional
group selected from the group consisting of carboxylic group (CO_2H and/or CO_2^-), amino
group, hydroxyl group, epoxy group and alkoxysilyl group, and content of monomer unit

formed by said monomer is 0.1 to 30 % by weight with respect to said conjugated diene/aromatic vinyl copolymeric rubber.

10. (Amended) The rubber composition according to [any one of Claims 2 to 9] Claim 2 wherein a monomer forming said monomer unit (b4) is at least one selected from the group consisting of

a carboxyl group containing compound such as (meth)acrylic acid, maleic acid, fumaric acid, itaconic acid, tetraconic acid, cinnamic acid, monoesters of at least one selected from the group consisting of phthalic acid, succinic acid and adipic acid with (meth)allyl alcohol or 2-hydroxyethyl (meth)acrylate, and salts thereof,

a hydroxyl group containing compound such as 2-hydroxyethyl (meth)acrylates, 2-hydroxypropyl (meth)acrylates, 3-hydroxypropyl (meth)acrylates, 2-hydroxybutyl (meth)acrylates, 3-hydroxybutyl (meth)acrylates, 4-hydroxybutyl (meth)acrylates, mono (meth)acrylates of polyethylene glycol (the number of ethylene glycol units is 2 to 23), mono (meth)acrylates of polypropylene glycol (the number of propylene glycol units is 2 to 23), N-hydroxymethyl (meth)acrylamide, N-(2-hydroxyethyl) (meth)acrylamide, N,N-bis(2-hydroxyethyl) (meth)acrylamide, o-hydroxystyrene, m-hydroxystyrene, p-hydroxystyrene, o-hydroxy- α -methylstyrene, m-hydroxy- α -methylstyrene, 5 p-hydroxy- α -methylstyrene p-vinylbenzyl alcohol and (meth)allyl alcohol, and

an epoxy group containing compound such as (meth)allylglycidylether, glycidyl (meth)acrylate and 3,4-oxycyclohexyl (meth)acrylate.

11. (Amended) The rubber composition according to [any one of Claims 1 to 10] claim 1 further comprising at least one of reinforcing filler selected from the group consisting of the inorganic compound represented by the formula (I), silica and carbon black.



[In the formula I, M_i is at least one selected from the group consisting of Al, Mg, Ti, and Ca; any oxide of any of the metals; or any hydroxide of any of the metals; and m, x, y, and z are integers from 1 to 5, 0 to 10, 2 to 5, and 0 to 10 respectively.]

12. (Amended) The rubber composition according to [any one of Claims 1 to 11]
claim 1 which is used for a tire.--

Claims 13-19 (New).

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